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FINAL REPORT OF MINIATURE CS DISSEMINATOR

AND

XM58 CS POCKET GRENADE

(ACTIV Project No. ACG 83-86.5/67I)

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DEPARTMENT OF THE ARMY
ARMY CONCEPT TEAM IN VIETNAM
APO San Francisco 96384

AVIB-CO

18 NOV 1968

SUBJECT: Final Report of Miniature CS Disseminator and XM58 CS
Pocket Grenade

Commanding General
United States Army, Vietnam
ATTN: AVHGC-DST
APO 96375

1. Reference: Letter, AVHGC-DH, Headquarters, US Army, Vietnam, 23 February 1967, subject: Letter of Instruction.
2. In accordance with the provisions of the foregoing reference, the attached final report is forwarded for review and transmittal to Department of the Army.
3. Request one copy of the USARV and CINCPACUSARPAC forwarding indorsement be furnished the Commanding Officer, Army Concept Team in Vietnam (ACTIV).

FOR THE COMMANDER:

Norman M. Leary
NORMAN M. LEARY
CPT, AGC
Adjutant

(U) ABSTRACT

The Miniature CS Disseminator (mini-grenade) and XM58 CS Pocket Grenade (pocket grenade) are small lightweight point source disseminators. The objectives of the ACTIV evaluation were:

To determine employment of the grenades during tactical operations.

To determine suitability of the grenades for use in the combat environment of Vietnam (RVN).

The grenades were employed to flush individuals from bunkers, to aid in clearing of villages, to reduce the effectiveness of enemy defensive measures, and to aid friendly troops in breaking contact. Military police noted that the grenades were effective in conventional riot control applications. The performance characteristics of the grenades were satisfactory in all evaluated employments, but the striker ring on the mini-grenade would become soft and unserviceable after extensive storage in humid and wet conditions. The mini-grenade was not considered suitable for use in RVN because of the fuzing system and light weight. The pocket grenades were acceptable because they were easy to grip and throw with accuracy. Their heavier weight gave them more penetrating ability than the mini-grenades. The pocket grenades, with modifications, are considered suitable for use in RVN.

DEPARTMENT OF THE ARMY
ARMY CONCEPT TEAM IN VIETNAM
APO San Francisco 96384

AVIB-GCD

10 NOV 1967

SUBJECT: Final Report - Miniature CS Disseminator and XM58 CS Pocket Grenade (ACTIV Project No. ACG 83-86.5/67I)

Commanding General
United States Army, Vietnam
ATTN: AVHGC-DST
APO 96375

1. REFERENCES

- a. Message, USARV, AVHGC-DST 47127, 09 July 1967, subject: Request for Miniature CS Disseminator (ENSURE).
- b. Letter, ACTIV, AVIB-GCD, 15 November 1967, subject: Evaluation; Miniature CS Disseminator (ENSURE Item 211); and XM58 CS Pocket Grenade (U).

2. PURPOSE

The purpose of this project was to evaluate the Miniature CS* Disseminator (hereafter called mini-grenade) (ENSURE 211) and the XM58 CS Pocket Grenade (hereafter called pocket grenade) in the Republic of Vietnam (RVN).

3. OBJECTIVES

- a. Objective 1. To determine employment of the grenades during tactical operations.
- b. Objective 2. To determine suitability of the grenades for use in the combat environment of RVN.

4. BACKGROUND

- a. CS was first used by US forces in RVN in late 1965. Two types of CS hand grenades (ABC-M7A3 and ABC-M25A2) were used successfully to flush

* Riot control agent CS (o-chlorobenzalmalononitrile) was named after Corson and Stoughton, who first synthesized the material.

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the enemy from tunnels and bunkers. Both munitions were bulky and awkward to carry through the dense vegetation encountered in RVN. Their weight and bulk often precluded use on long-range tactical operations. Unit commanders requested that small grenades be developed. In July 1967, Headquarters US Army, Vietnam (USARV) submitted an ENSURE request for a miniaturized CS grenade (ref 1a). In response to this ENSURE request a lightweight miniature CS disseminator was developed by the United States Army Limited War Laboratory (LWL). At the same time Edgewood Arsenal developed the small lightweight pocket grenade and offered it to LWL as another approach to satisfy ENSURE 211. In November 1967, LWL furnished both miniaturized CS grenades to USARV for evaluation. These were added to an ACTIV CS munitions evaluation project which originated with a March 1967 proposal by the Assistant Chief of Staff for Force Development (ACSPOR), Department of the Army (DA), to conduct a combat evaluation of all CS munitions being developed for RVN. This report is the fifth of a series covering the ACTIV evaluation of over 20 CS munitions.

5. DESCRIPTION AND OPERATION OF THE MINI-GRENADE AND THE POCKET GRENADE

The mini and pocket grenades (see Figure 1) are intended to dispense CS into the atmosphere to temporarily incapacitate the enemy without inflicting permanent physical harm. CS is a riot control agent which has a pepper-like odor and causes extreme burning of the eyes, copious flow of tears, coughing, and difficulty in breathing. Effects last from five to ten minutes after the individual reaches fresh air. Both grenades can be carried in the pockets of the fatigue uniform. They are designed to emit sufficient CS to incapacitate enemy personnel in small bunkers, tunnels, and spider holes.

a. Mini-Grenade

The mini-grenade (see Figure 2) is a flat-top aluminum photocan (35mm size) type container containing CS agent in eight gelatin capsules, a pyrotechnic energy source, a matchhead fuze igniter cord, and a cardboard striker ring. The can has a screw cap which is sealed against moisture by a sealing disc. A piece of red pressure-sensitive plastic tape seals the outside joint between the grenade body and screw cap. Technical data pertaining to the mini-grenade are:

Length of grenade	1-3/4 inches
Diameter of body	1-1/4 inches
Weight of grenade	35 grams
Filling	6 grams CS encapsulated in 8 capsules

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Throwing distance	Approximately 35 meters (116 ft)
Ignition delay time	3 to 4 seconds
Burning time	6 to 8 seconds
Fuze	Striker ring and matchhead fuze.



FIGURE 1. XM58 CS Pocket Grenade (Pocket Grenade) and Miniature CS Disseminator (Mini-Grenade).

The mini-grenade can be activated after the pressure-sensitive tape is removed from the screw cap, and the cap is removed from the grenade. The striker ring is vigorously rubbed against the matchhead fuze igniter cord. After ignition of the fuze and a delay of three to four seconds, the encapsulated CS is vaporized by the pyrotechnic energy source. CS is emitted for six to eight seconds.

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Grenade (ACTIV Project No. ACG 83-86.5/67I)

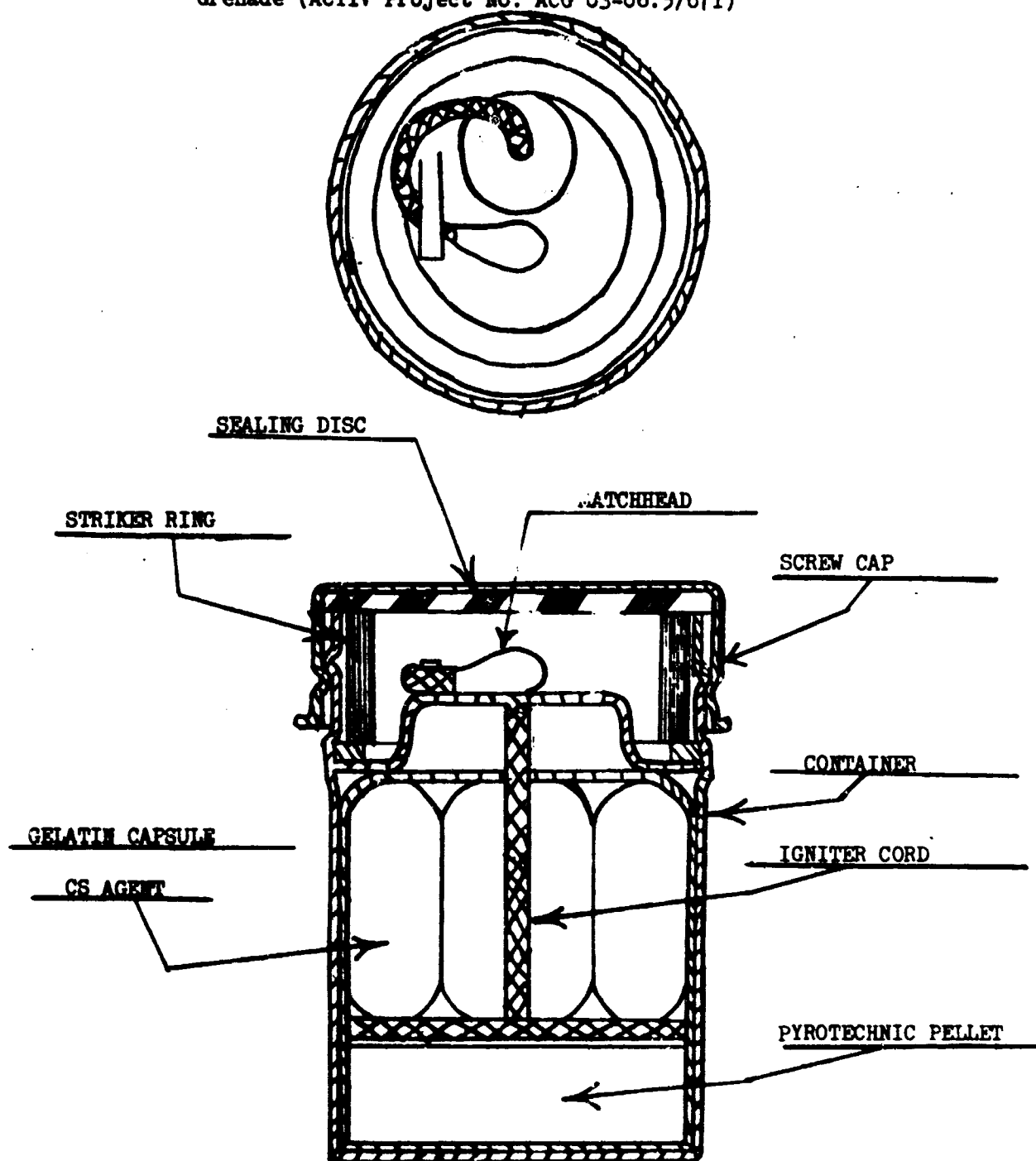


FIGURE 2. Miniature CS Grenade Cross-section View.

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b. Pocket Grenade

The pocket grenade consists of a two-piece aluminum body assembly (see Figure 3) which contains the CS-pyrotechnic mixture filling. An emission hole is centrally located in the bottom of the body assembly and is covered with pressure-sensitive tape. A modified M208 fuze is positioned in the top of the body assembly. Technical data pertaining to the pocket grenade are:

Length of grenade	3-5/8 inches
Diameter of body	1-5/16 inches
Weight of grenade	117.94 grams
Filling	12.0 grams CS-pyrotechnic mixture
Throwing distance	Approximately 45 meters (148 ft)
Ignition delay time	1 to 3 seconds
Burning time	12 to 20 seconds
Fuze	M208 (modified).

The pocket grenade fuze is activated after removal of a safety pin and release of the safety lever. The safety lever is released during the process of throwing the grenade. The fuze striker hits the percussion primer and a one- to three-second burning fuze delay is ignited. This in turn causes the ignition mixture to burn and ignites the CS-pyrotechnic mixture. Pressure in the grenade body caused by the ignited CS-pyrotechnic mixture blows the pressure-sensitive tape off the emission hole, and a CS cloud is emitted for 12 to 20 seconds.

6. METHOD OF EVALUATION

The mini-grenade and the pocket grenade were made available to the 9th Infantry Division, 25th Infantry Division, and 101st Airborne Division (Airmobile) a month prior to the beginning of the ACTIV evaluation. There was no requirement to train unit personnel in use of the grenades. Questionnaires were furnished with the grenades. A team of evaluators was provided from CONUS by ACSFOR, DA, to assist ACTIV in the evaluation of a series of CS munitions. During the period 22 January to 14 April 1968, this team visited all major USARV tactical units and collected data on CS munitions.

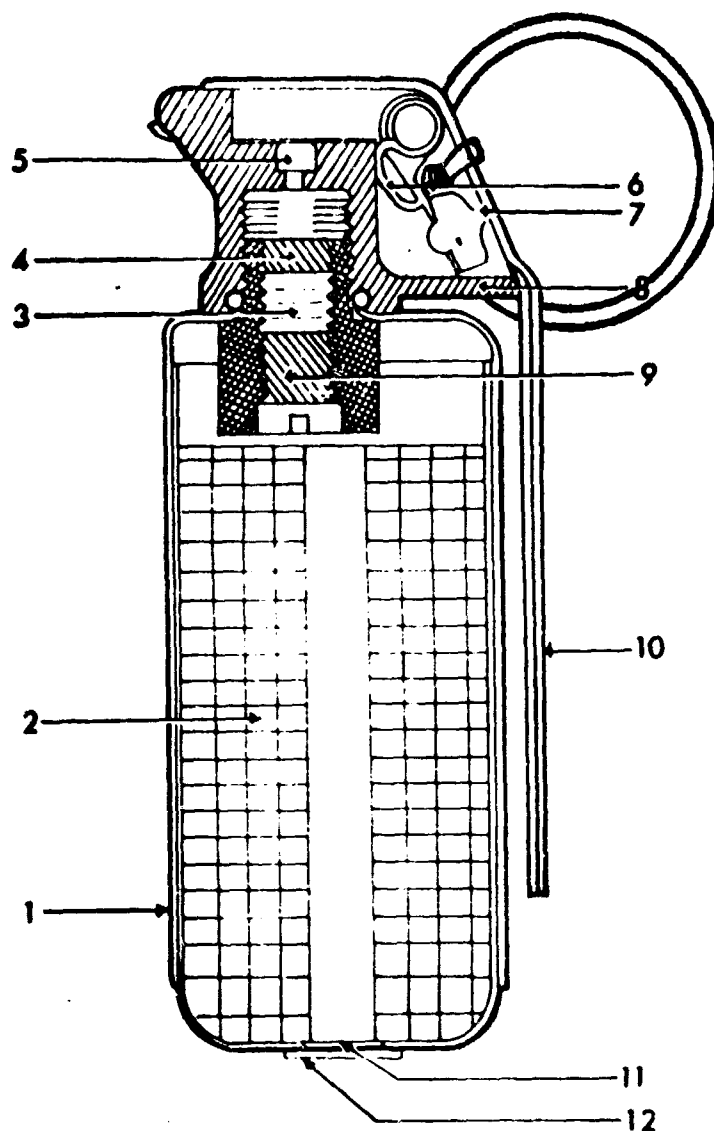
7. EMPLOYMENT

The mini and pocket grenades were used by infantry companies, military police units, and long range patrol (LRP) companies. The grenades were

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- | | |
|---------------------------|-----------------------------|
| 1. Body assembly | 7. Striker |
| 2. CS-pyrotechnic mixture | 8. Fuze body |
| 3. Delay mixture | 9. Ignition mixture |
| 4. First-fire mixture | 10. Safety lever |
| 5. Primer | 11. Emission hole |
| 6. Striker spring | 12. Pressure-sensitive tape |

FIGURE 3. XM58 CS Pocket Grenade, Cross-Section View.

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employed in rice paddies, light brush, high grass, and open country to flush individuals from bunkers, to aid in clearing of villages, to reduce the effectiveness of enemy defensive measures, and to aid friendly troops in breaking contact. The number of grenades used on a target depended on the ground cover and the type of target. Against bunkers and dwellings in villages, one grenade was usually sufficient. When used in the attack or to break contact, several grenades were required to produce the desired effect. Military police noted that the grenades were effective in conventional riot control applications such as policing places of entertainment, breaking up small crowds, and suppressing disturbances that arise in stockades and prisoner-of-war collection points. One respondent stated that when employed in small enclosures the grenade had an adequate concentration of CS to be effective, but was not lethal. One commander stated that he required his platoon to carry only two protective masks while in the field. The relatively small cloud of CS produced by the grenades did not require the personnel to wear protective masks as they were able to move around or away from the CS cloud. When detected by the enemy LRP teams used the CS grenades to provide a screen through which pursuing enemy would have to pass. This was done by building up an initial concentration with three or four grenades, and then dropping grenades at random during withdrawal.

8. SUITABILITY

a. Handling

All respondents agreed that the mini and pocket grenades were easily carried in the pockets of the combat fatigues or, in the case of the pocket grenade, attached to the belt or web gear. The grenades were easily thrown with accuracy, the pocket grenade exceeding the mini-grenade in distance. The respondents favored the pocket grenade fuze system over that of the mini-grenade because they needed only to pull the pin to activate the fuze.

b. Functioning

The mini-grenade functioned properly in all reported incidents. It was discovered that the striker ring on the mini-grenade would become soft and unserviceable after extensive storage in the humid and wet climate of RVN. One unit reported that at times it required three to five attempts at striking the matchhead before the fuze would ignite. However, once activated the mini-grenade functioned reliably in water and mud. The pocket grenade did not function reliably in water or mud. When thrown in this type terrain, the pocket grenades would be extinguished if completely

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submerged in water or mud. Users suggested that the safety pin of the pocket grenade be made longer to ensure that the pin would not be accidentally removed during rough handling.

c. Acceptability

(1) Unit commanders stated that there was a definite need for a small, lightweight CS grenade in RVN. The use of the small grenades did not necessitate wearing the protective mask because of the small quantity of CS emitted. During operations some units substituted smoke or white phosphorous grenades for the large CS grenades (ABC-M7A3 and ABC-M25A2) because of the need to carry the protective mask when employing standard CS grenades. The lightweight and small size features of the mini and pocket grenades were ideal for carrying. Depending on the terrain and type of operation the infantry platoon normally carried two to five CS grenades but was able to carry 8 to 12 mini and pocket grenades.

(2) The mini-grenade was too light to penetrate dense foliage. This limitation is a direct result of the grenade's size and agent-producing capability. Employment of less than five mini-grenades in even relatively open areas had limited value as the agent was quickly dissipated by the slightest wind. It was suggested that the amount of tear agent and the size of the mini-grenade be increased twofold (however it should be noted that this negates the mini-grenade concept). The ignition system now employed on the mini-grenade was not acceptable to combat units because of the difficulty encountered with lighting the fuze. On occasion it was necessary to strike the matchhead five or more times. The "flash" of the matchhead ignition violated light discipline, thus pinpointing the individual's position. Tactical units stated that, while opening the canister, removing the striker, and igniting the grenade, the individual's attention was diverted from the tactical situation.

(3) The pocket grenade was acceptable to the units because it was easy to grip and throw with accuracy. The heavier weight gave it more penetrating ability than the mini-grenade. When both the mini and pocket grenades were evaluated by a unit, the pocket grenade was favored over the mini-grenade because of the ease of operation. It was suggested that the mini-grenade design be similar to that of the pocket grenade.

(4) Commanders stated that the 40mm CS cartridge (see ACTIV Report ACG 83-86.6/67I, Nov 68) would meet most of the requirements of a lightweight grenade. The deciding factor was the range and accuracy of the 40mm grenade over the hand thrown mini and pocket grenades. However, the small grenades would be useful at short distances and within enclosures.

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9. FINDINGS

- a. There was a valid requirement for a miniaturized grenade in RVN for use by reconnaissance elements and small unit patrols.
- b. The mini and pocket grenades were effective against point targets, but not area targets.
- c. The mini-grenade was not acceptable because of the fuzing system and light weight.
- d. The mini-grenade functioned reliably in water and mud.
- e. When immersed in water or soft mud, the pocket grenade would not function.
- f. The safety pin was too short on the pocket grenade.

10. CONCLUSIONS

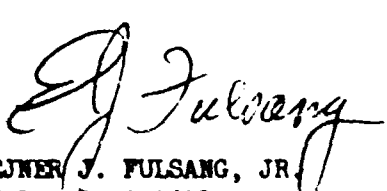
- a. The mini-grenade is not suitable for use in RVN.
- b. The pocket grenade is suitable for use in RVN.

11. RECOMMENDATIONS

It is recommended that:

- a. The safety pin on the pocket grenade be lengthened to prevent accidental ignition.
- b. The reliability of the pocket grenade, when employed in water or soft mud, be improved.

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13. ABSTRACT		
<p>The Miniature CS Disseminator (mini-grenade) and XM58 CS Pocket Grenade (pocket grenade) are small lightweight point source disseminators. The objectives of the ACTIV evaluation were:</p> <p>To determine employment of the grenades during tactical operations,</p> <p>To determine suitability of the grenades for use in the combat environment of RVN.</p> <p>The grenades were employed to flush individuals from bunkers, to aid in clearing of villages, to reduce the effectiveness of enemy defensive measures, and to aid friendly troops in breaking contact. Military police noted that the grenades were effective in conventional riot control applications. The performance characteristics of the grenades were satisfactory in all evaluated employments, but the striker ring on the mini-grenade would become soft and unserviceable after extensive storage in humid and wet conditions. The mini-grenades are not considered suitable for use in RVN because of the fuze system and light weight. The pocket grenades were acceptable because they were easy to grip and throw with accuracy. Their heavier weight gave them more penetrating ability than the mini-grenades. The pocket grenades, with modifications, are considered suitable for use in RVN.</p>		

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	ROLE	WT	ROLE	WT	ROLE	WT
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XM58 CS POCKET GRENADE						
RIOT CONTROL AGENT CS						
CS MUNITIONS						

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